

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: M. HANNUKSELA
Serial No.: Not yet assigned
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For: VIDEO ERROR RESILIENCE
Group: Not yet assigned
Examiner: Not yet assigned

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

June 29, 2001

Sir:

Prior to examination, please amend the above-identified application as follows.

IN THE CLAIMS

Please amend the claims as follows:

6. (Amended) A method according to claim 1,
characterised in that:

said encoding of said second set of M video frames
is achieved by:

assigning each of said M video frames a sequential
compression order number, said earliest occurring video frame of
said second set being assigned a lowest compression order number
and said latest occurring video frame of said second set being
assigned a highest compression order number;

indicating said second video frame as a prediction reference frame for encoding said video frame having said lowest compression order number;

encoding said second set of video frames in INTER frame format in ascending order of compression order number.

9. (Amended) A method according to claim 1, further comprising:

identifying a second indication that a further video frame should be encoded in said first compressed video frame format; and

for a group of frames including said first video frame and the frames occurring between the first video frame and the further video frame, defining said second video frame as the frame occurring substantially centrally within the group of frames.

16. (Amended) A method according to claim 1, further comprising associating with the compressed video sequence information concerning the intended playback order of the frames of the compressed video sequence.

17. (Amended) A method according to claim 1, further comprising associating with the compressed video sequence information concerning the intended playback time of the frames of the compressed video sequence.

31. (Amended) A computer program for operating a computer, comprising:

a first computer program for operating the computer as a video encoder; and

a second computer program for operating the computer as a video decoder,

wherein said first computer program for operating the computer as a video encoder encodes a sequence of video frames to form a compressed video sequence, said compressed video sequence comprising frames encoded in at least a first compressed video frame format and a second compressed video frame format, said first compressed video frame format being a non-temporally predicted format and said second compressed video frame format being a temporally predicted format,

wherein said first computer program comprises:

computer executable code for identifying a first indication associated with a first video frame that said first video frame should be encoded in said first compressed video frame format;

computer executable code for associating said first indication with a second video frame;

computer executable code for encoding said second video frame in said first compressed video frame format;

computer executable code for defining a first set of video frames comprising N video frames occurring prior to said second video frame;

computer executable code for encoding said first set of video frames in said second compressed video frame format;

computer executable code for defining a second set of video frames comprising M video frames occurring after said second video frame; and

computer executable code for encoding said second set of video frames in said second compressed video frame format,

wherein said second computer program for operating the computer as a video decoder decodes a compressed video sequence to form a sequence of decompressed video frames, said compressed video sequence comprising frames encoded in at least a first compressed video frame format and a second compressed video frame format, said first compressed video frame format being a non-temporally predicted format and said second compressed video frame format being a temporally predicted format,

wherein said second computer program comprises:

computer executable code for identifying a first indication associated with a first video frame that said first video frame is encoded in said first compressed video frame format;

computer executable code for decoding said first video frame;

computer executable code for receiving a first set of N frames in said second compressed video frame format for inclusion in said decompressed video sequence prior to said first video frame;

computer executable code for decoding said first set of N video frames;

computer executable code for ordering the frames of the first set of frame in accordance with playback information associated with the frames of the first set;

computer executable code for receiving a second set of M video frames in said second compressed video frame format for inclusion in said decompressed video sequence after said first video frame; and

computer executable code for decoding said second set of video frames.

IN THE ABSTRACT

Please replace the Abstract with the attached new Abstract.

REMARKS

Attached hereto is a marked-up copy version of the changes made to the claims by the current Amendment. The attached page is captioned "Version with markings to show changes made".

Entry of the above amendments prior to examination is respectfully requested.

Please charge any shortage in fees due in connection with the filing of this paper, or credit any overpayment of fees,

[illegible]

ANTONELLI, TERRY, STOUT & KRAUS, LLP

Robert M. Bauer
Robert M. Bauer
Registration No. 34,487

RMB/CIB/jdc
(703) 312-6600

Abstract

The invention provides a method that reduces degradation in the perceived quality of images in a video sequence due to data loss. This effect is achieved by effectively delaying the insertion of an INTRA coded frame after a periodic INTRA frame refresh, INTRA update request, or scene cut. Frames associated with INTRA frame requests are not themselves coded in INTRA format, but instead a frame occurring later in the video sequence is chosen for coding in INTRA format. Preferably, the actual INTRA frame is selected such that it lies approximately mid-way between periodic INTRA requests. Frames occurring prior to the actual INTRA coded frame are encoded using temporal prediction, in reverse order, starting from the actual INTRA frame, while those frames occurring after the INTRA coded frame are encoded using temporal prediction in the forward direction.

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS

Please amend the claims as follows:

6. (Amended) A method according to ~~any preceding~~ claim 1, characterised in that:

said encoding of said second set of M video frames is achieved by:

assigning each of said M video frames a sequential compression order number, said earliest occurring video frame of said second set being assigned a lowest compression order number and said latest occurring video frame of said second set being assigned a highest compression order number;

indicating said second video frame as a prediction reference frame for encoding said video frame having said lowest compression order number;

encoding said second set of video frames in INTER frame format in ascending order of compression order number.

9. (Amended) A method according to ~~any preceding~~ claim 1, further comprising:

identifying a second indication that a further video frame should be encoded in said first compressed video frame format; and

for a group of frames including said first video frame and the frames occurring between the first video frame and the further video frame, defining said second video frame as the frame

occurring substantially centrally within the group of frames.

16. (Amended) A method according to ~~any preceding~~ claim 1, further comprising associating with the compressed video sequence information concerning the intended playback order of the frames of the compressed video sequence.

17. (Amended) A method according to ~~any preceding~~ claim 1, further comprising associating with the compressed video sequence information concerning the intended playback time of the frames of the compressed video sequence.

31. (Amended) A computer program ~~according to claims 29 and 30~~ for operating a computer, comprising:

a first computer program for operating the computer as a video encoder; and

a second computer program for operating the computer as a video decoder,

wherein said first computer program for operating the computer as a video encoder encodes a sequence of video frames to form a compressed video sequence, said compressed video sequence comprising frames encoded in at least a first compressed video frame format and a second compressed video frame format, said first compressed video frame format being a non-temporally predicted format and said second compressed video frame format being a temporally predicted format,

wherein said first computer program comprises:

computer executable code for identifying a first indication associated with a first video frame that said first video frame should be encoded in said first compressed video frame format;

computer executable code for associating said first indication with a second video frame;

computer executable code for encoding said second video frame in said first compressed video frame format;

computer executable code for defining a first set of video frames comprising N video frames occurring prior to said second video frame;

computer executable code for encoding said first set of video frames in said second compressed video frame format;

computer executable code for defining a second set of video frames comprising M video frames occurring after said second video frame; and

computer executable code for encoding said second set of video frames in said second compressed video frame format,

wherein said second computer program for operating the computer as a video decoder decodes a compressed video sequence to form a sequence of decompressed video frames, said compressed video sequence comprising frames encoded in at least a first compressed video frame format and a second compressed video frame format, said first compressed video frame format being a non-temporally predicted format and said second compressed video frame format being a temporally predicted format,

wherein said second computer program comprises:

computer executable code for identifying a first indication associated with a first video frame that said first video frame is encoded in said first compressed video frame format;

computer executable code for decoding said first video frame;

computer executable code for receiving a first set of N frames in said second compressed video frame format for inclusion in said decompressed video sequence prior to said first video frame;

computer executable code for decoding said first set of N video frames;

computer executable code for ordering the frames of the first set of frame in accordance with playback information associated with the frames of the first set;

computer executable code for receiving a second set of M video frames in said second compressed video frame format for inclusion in said decompressed video sequence after said first video frame; and

computer executable code for decoding said second set of video frames.